

The University of Texas at El Paso
College of Engineering
Department of Mechanical Engineering
Syllabus

Course Prefix and Number: AERO 4332
Course Title: Hypersonic Vehicle Design
Credit Hours: 3

Prerequisite Courses:
MECH 3352: Engineering Analysis

Course Description:
Supersonic and hypersonic vehicles range from missiles, to space launch vehicles, and high altitude high speed aircraft. This course introduces the design requirements and principles for common hypersonic vehicle applications. The operating environment, operational loads, and subsystem requirements are applied to the design process.

Learning Outcomes:

- Critically analyze hypersonic vehicle applications and the associated environmental and operational considerations
- Apply engineering analysis to hypersonic vehicle design
- Identify requirements and data sources for hypersonic vehicle design and evaluation
- Apply computational analysis and modelling in the hypersonic vehicle process

Required Materials: All required materials will be provided

Course Schedule:

- Week 1-5 Missiles: design requirements; aerodynamic, structural and propulsion considerations; weight distribution and estimation; flight performance and measures of merit.
- Weeks 6-10 Space Launch Vehicles: design requirements; energy requirements and trajectories; structural and propulsion considerations; mass fractions; vehicle sizing and staging; aerothermodynamic environment;
- Weeks 11-15 Hypersonic Aircraft: mission classes and definitions; aerodynamic, structural and propulsion considerations; atmosphere and gravity models; hypersonic flight mechanics; Continuous optimal control; Guidance algorithms;